bnftran

Transforming former saved Bnormal data on predefined surface grid into Fourier harmonics.

[called by: identfy.]

1.1 overview

1. Discrete Bnormal distribution on the surface grid can be represented by a two-dimensional Forurier series.

$$B_n(\theta,\zeta) \equiv \sum_{m,n} B^c_{mn} cos(m\theta - n\zeta) \ + \ B^s_{mn} sin(m\theta - n\zeta) \tag{1}$$

2. So, the Fourier harmonics B^c_{mn} and B^s_{mn} can be computed as,

$$\begin{aligned} B^c_{mn} &= \frac{1}{2\pi^2}\int_0^{2\pi}\int_0^{2\pi} B_n(\theta,\zeta)cos(m\theta-n\zeta)d\theta d\zeta \quad \text{(for } (0,0) \text{ term should be } \tfrac{1}{4\pi^2}) && (2)\\ &\approx \frac{2}{Nteta \times Nzeta}\sum_0^{Nteta-1}\sum_0^{Nzeta-1} B_n(iteta,jzeta)cos(m\theta-n\zeta) && (3)\\ B^s_{mn} &= \frac{1}{2\pi^2}\int_0^{2\pi}\int_0^{2\pi} B_n(\theta,\zeta)sin(m\theta-n\zeta)d\theta d\zeta quad\text{(for } (0,0) \text{ term should be } \tfrac{1}{4\pi^2}) && (4)\\ &\approx \frac{2}{Nteta \times Nzeta}\sum_0^{Nteta-1}\sum_0^{Nzeta-1} B_n(iteta,jzeta)sin(m\theta-n\zeta) && (5) \end{aligned}$$

3. If there exist conjugated terms (e.g. m,n and -m,-n), the computed terms will be timed with a factor of 2 or 0;
4. What should be noted is that the maximum modes in Fouries harmonics should not be less/equal than the half of surface grid resolutions.